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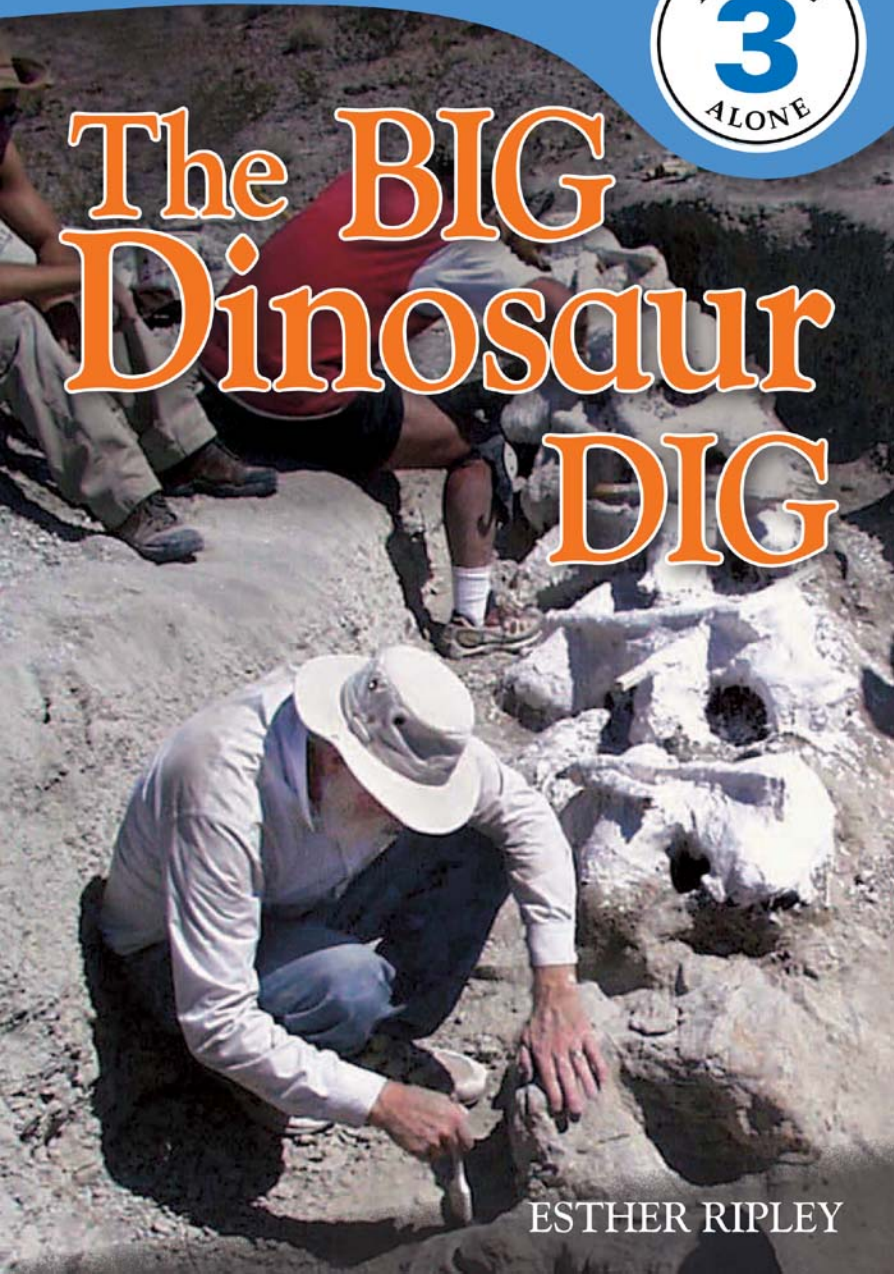
LANZAROTE
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READERS



The BIG Dinosaur DIG



ESTHER RIPLEY



READERS

Level 3

Shark Attack!
Titanic
Invaders from Outer Space
Movie Magic
Time Traveler
Bermuda Triangle
Tiger Tales
Zeppelin: The Age of the Airship
Spies
Terror on the Amazon
Disasters at Sea
The Story of Anne Frank
Abraham Lincoln: Lawyer, Leader, Legend
George Washington: Soldier, Hero, President
Extreme Sports
Spiders' Secrets
The Big Dinosaur Dig
Space Heroes: Amazing Astronauts
The Story of Chocolate
School Days Around the World
Polar Bear Alert!
Welcome to China
My First Ballet Show
Ape Adventures

Greek Myths
MLB: Home Run Heroes: Big Mac, Sammy, and Junior
MLB: World Series Heroes
MLB: Record Breakers
MLB: Down to the Wire: Baseball's Great Pennant Races
Star Wars: Star Pilot
Star Wars: I Want to Be a Jedi
Star Wars: The Story of Darth Vader
Star Wars: Yoda in Action
Star Wars: Forces of Darkness
Marvel Heroes: Amazing Powers
The X-Men School
Abraham Lincoln: Abogado, Líder, Leyenda *en español*
Al Espacio: La Carrera a la Luna *en español*
Fantastic Four: The World's Greatest Superteam
Pokemon: Become a Pokemon Trainer
Wolverine: Awesome Powers
Iron Man: Friends and Enemies

Level 4

Volcanoes and Other Natural Disasters
Pirates! Raiders of the High Seas
Micromonsters
Going for Gold!
Extreme Machines
Flying Ace: The Story of Amelia Earhart
Black Beauty
Free at Last! The Story of
Martin Luther King, Jr.
Joan of Arc
Spooky Spinechillers
Welcome to The Globe! The Story of
Shakespeare's Theater
Space Station: Accident on Mir
Atlantis: The Lost City?
Dinosaur Detectives
Danger on the Mountain: Scaling
the World's Highest Peaks
Crime Busters
The Story of Muhammad Ali
First Flight: The Story of the
Wright Brothers
D-Day Landings: The Story of
the Allied Invasion
Solo Sailing
Thomas Edison: The Great Inventor
Dinosaurs! Battle of the Bones
Skate!
MLB: Strikeout Kings
MLB: Super Shortstops: Jeter, Nomar,
and A-Rod
MLB: The Story of the New York Yankees
MLB: The World of Baseball
MLB: October Magic: All the Best
World Series!
JLA: Batman's Guide to Crime and Detection

JLA: Superman's Guide to the Universe
JLA: Aquaman's Guide to the Oceans
JLA: Wonder Woman's Book of Myths
JLA: Flash's Book of Speed
JLA: Green Lantern's Book of Inventions
The Story of the X-Men: How it all Began
Creating the X-Men: How Comic Books
Come to Life
Spider-Man's Amazing Powers
The Story of Spider-Man
The Incredible Hulk's Book of Strength
The Story of the Incredible Hulk
Transformers: The Awakening
Transformers: The Quest
Transformers: The Unicron Battles
Transformers: The Uprising
Transformers: Megatron Returns
Transformers: Terrorcon Attack
Star Wars: Galactic Crisis!
Star Wars: Beware the Dark Side
Star Wars: Epic Battles
Star Wars: Jedi Adventures
Marvel Heroes: Greatest Battles
Fantastic Four: Evil Adversaries
Graphic Readers: The Price of Victory
Graphic Readers: The Terror Trail
Graphic Readers: Curse of the Crocodile God
Graphic Readers: Instruments of Death
Graphic Readers: The Spy-Catcher Gang
Graphic Readers: Wagon Train Adventure
Los Asombrosos Poderes de Spider-Man
en español
La Historia de Spider-Man *en español*
Wolverine: The Story of Wolverine
The Rise of Iron Man

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Beautiful illustrations and superb full-color photographs combine with engaging, easy-to-read stories to offer a fresh approach to each subject in the series. Each DK READER is guaranteed to capture a child's interest while developing his or her reading skills, general knowledge, and love of reading.

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Level 1: Beginning to read

Level 2: Beginning to read alone

Level 3: Reading alone

Level 4: Proficient readers

The “normal” age at which a child begins to read can be anywhere from three to eight years old. Adult participation through the lower levels is very helpful for providing encouragement, discussing storylines, and sounding out unfamiliar words.

No matter which level you select, you can be sure that you are helping your child learn to read, then read to learn!





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READERS



THE BIG DINOSAUR DIG

Written by Esther Ripley



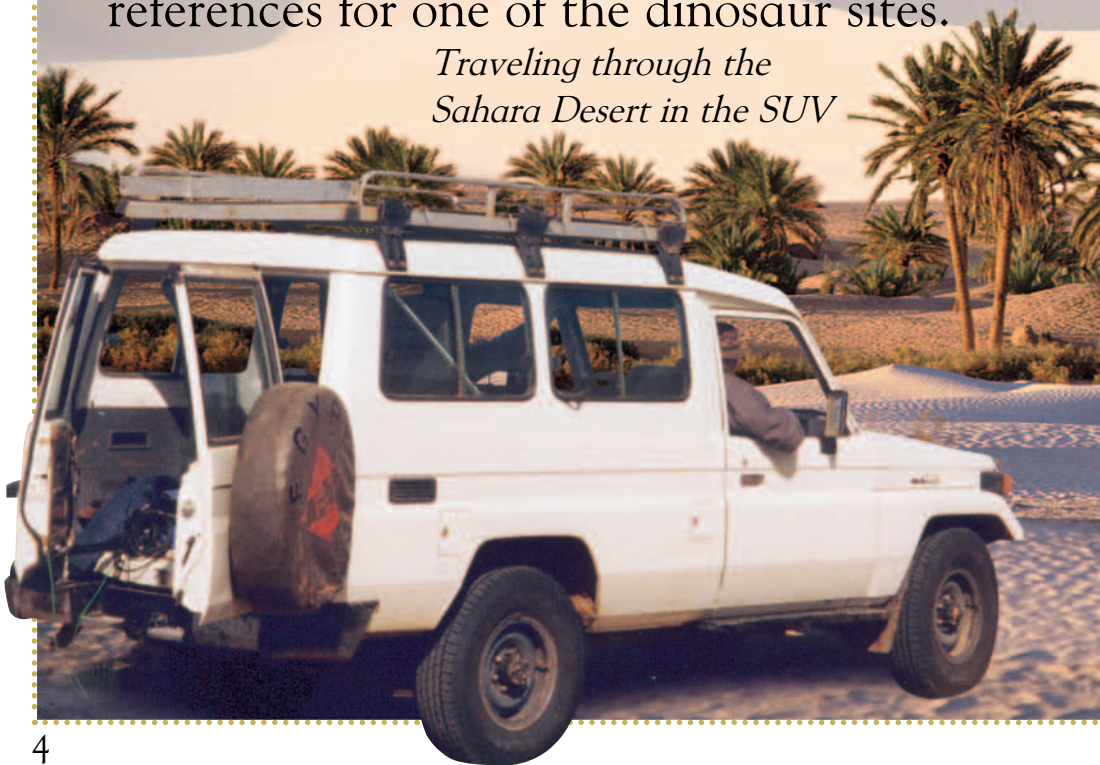
DK Publishing

Lost and found

Josh Smith climbed out of the SUV and gazed across the sand and rocks. Somewhere in this desert he was hoping to find a treasure trove of dinosaur fossils.

In the early 1900s, a fossil hunter had found the bones of huge dinosaurs in part of the Sahara Desert in Egypt. Although this fossil hunter died many years ago, Josh had the map references for one of the dinosaur sites.

*Traveling through the
Sahara Desert in the SUV*



They were recorded in his Global Positioning System, or GPS—a handy little computer that uses satellites to help people navigate.

The GPS beeped repeatedly. It was telling Josh that he had reached the right spot.

But Josh was puzzled. “This doesn’t look like it at all,” he said to his partner Jen, who was driving. “There’s supposed to be a mountain here.”



*Global
Positioning
System*

Dinosaur fossils

Over millions of years, dinosaur bones buried under layers of rock turn into solid stone, forming fossils.





When Josh was six years old and growing up in Orange, Massachusetts, he was given his first book about dinosaurs. His favorite dinosaur was *Spinosaurus*—a carnivore with a huge fin on its back that stood up like a sail.

The fossilized bones of *Spinosaurus* were discovered in the Bahariya Oasis in the Sahara Desert by a German fossil hunter named Ernst Stromer. Traveling by camel, Stromer made a trip into the desert to dig out the fossilized bones and take them back to Germany.





*The skull and teeth of
Carcharodontosaurus*

Ernst Stromer also unearthed sharp, jagged teeth belonging to another huge meat eater, which he named *Carcharodontosaurus*. There were



*Ernst
Stromer*

also giant, solid bones from a heavyweight sauropod—a plant-eating dinosaur with a long neck and legs like tree trunks. He called it *Aegyptosaurus*, which means “Egyptian lizard.”



After years of preparation, an incomplete 50-foot-(15.2-m-) long skeleton of *Spinosaurus* was put on display in a museum in Munich.

But in 1944, during an air raid on Munich in World War II, a bomb fell on the museum. The building and Stromer's precious dinosaur bones were destroyed.



The skeleton of Spinosaurus, which means “thorn lizard”

*Studying a
dinosaur bone*

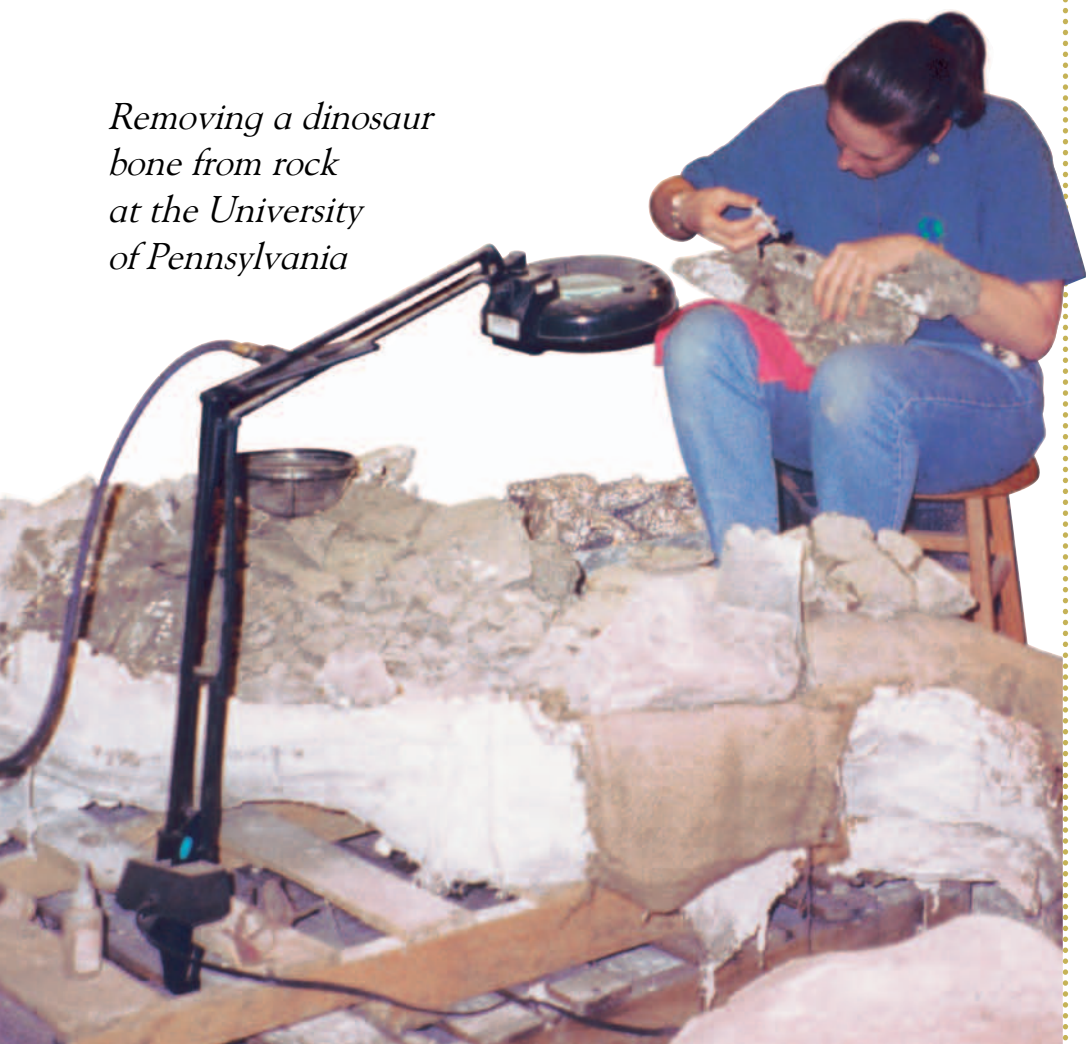


Josh's fascination with dinosaurs continued as he grew up. He went to the University of Pennsylvania to study paleontology, which is the science of studying life on Earth as it was millions of years ago. For his final degree, Josh had to complete a big project and choose a site for a dig. Josh knew exactly where he wanted to go.



He wanted to follow Stromer's footsteps into the Bahariya Oasis in the Sahara and find more examples of the dinosaur bones that were destroyed in the air raid during the war. If he was really lucky he might even find a new dinosaur.

*Removing a dinosaur
bone from rock
at the University
of Pennsylvania*





*Rocky badlands
of North America*



*Plains and grasslands
in South America*



For 180 million years, dinosaurs roamed every part of the earth. Fossil hunters find their bones on every continent—on the plains and grasslands in South America, in the rocky badlands of North America, in quarries in Europe, in the desert in Asia, in Australia, and even in the frozen Antarctic.



*Desert of
Asia*

But for many years,
no one had returned
to where Stromer
had excavated
in Africa. This
was where Josh
and his partner
Jen traveled
to find out if
there were more
dinosaur remains.

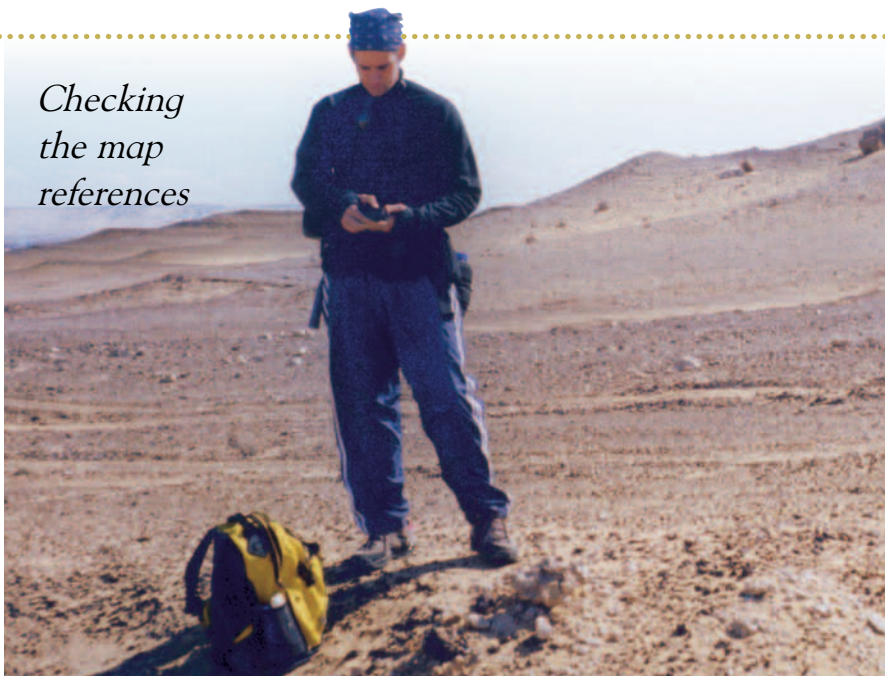
Antarctica

New dinosaurs

At least seven new types
of dinosaur are discovered
every year, revealing more
and more about life when
dinosaurs ruled the world.



*Checking
the map
references*



Josh and Jen used Stromer's notes about his expeditions to search for his dinosaur site. But Josh decided that the map reference recorded in his GPS must be wrong. The site was supposed to be at the base of a distinctive cone-shaped mountain called Gebel el Dist, but this was nowhere in sight.

Back in the SUV, Jen drove east with Josh leaning out of the window, scanning the horizon for Gebel el Dist.

Suddenly he saw something. It looked like a log lying on the sand.

“Can you pull up here, Jen? I need to take a look.”

Carefully brushing away the sand, Josh uncovered a thick bone about a foot (30 cm) long, broken in three places. He could hardly believe his luck. From its size and shape, Josh guessed it belonged to a large plant eater—perhaps an *Aegyptosaurus*.



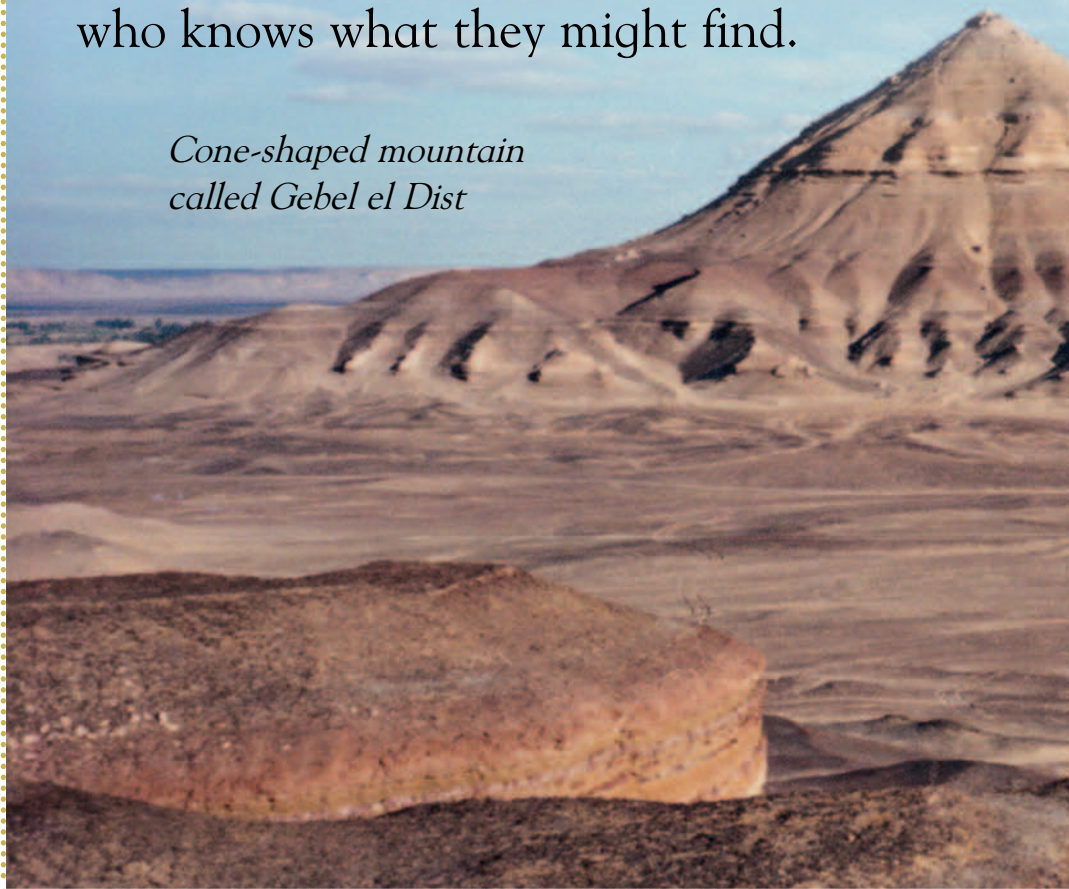
Brushing away the sand



Part of the bone that was uncovered

The discovery of one bone was not a big enough find to launch a fossil hunting expedition, but, later that day, Josh and Jen were lucky again. Driving back across the desert, they found Gebel el Dist. The area was littered with pieces of fossilized bone. Josh was very excited. If he could bring a team to Egypt, who knows what they might find.

*Cone-shaped mountain
called Gebel el Dist*



Back home Josh paired up with a paleontologist friend, Matt Lamanna, to raise the \$60,000 they needed for an expedition. They had a good story to tell about Stromer, the dinosaur bones destroyed in the war, and Josh's finds in the desert. A film company decided to sponsor the trip and make a film about it called *The Lost Dinosaurs of Egypt*.

*Josh Smith and Matt
Lamanna find sponsors*



The expedition

Almost a year later, a dig team of paleontologists and field workers and a film crew rolled into Bawiti, a small mining village in the Bahariya Oasis. Josh, Jen, and Matt were also joined by Jason, nicknamed “Chewie” because he reminded everyone of Chewbacca from the movie *Star Wars*. Chewie was an expert in preserving fossils.



Fossil hunters usually work in remote places with few comforts, so the team members were surprised and pleased to discover that their lodgings had hot showers and flushable toilets.

“We’re used to mud huts with a dirt floor and a pit for a toilet,” said a delighted Jen.

Bawiti village





The team starts digging at Stromer's old bone pits

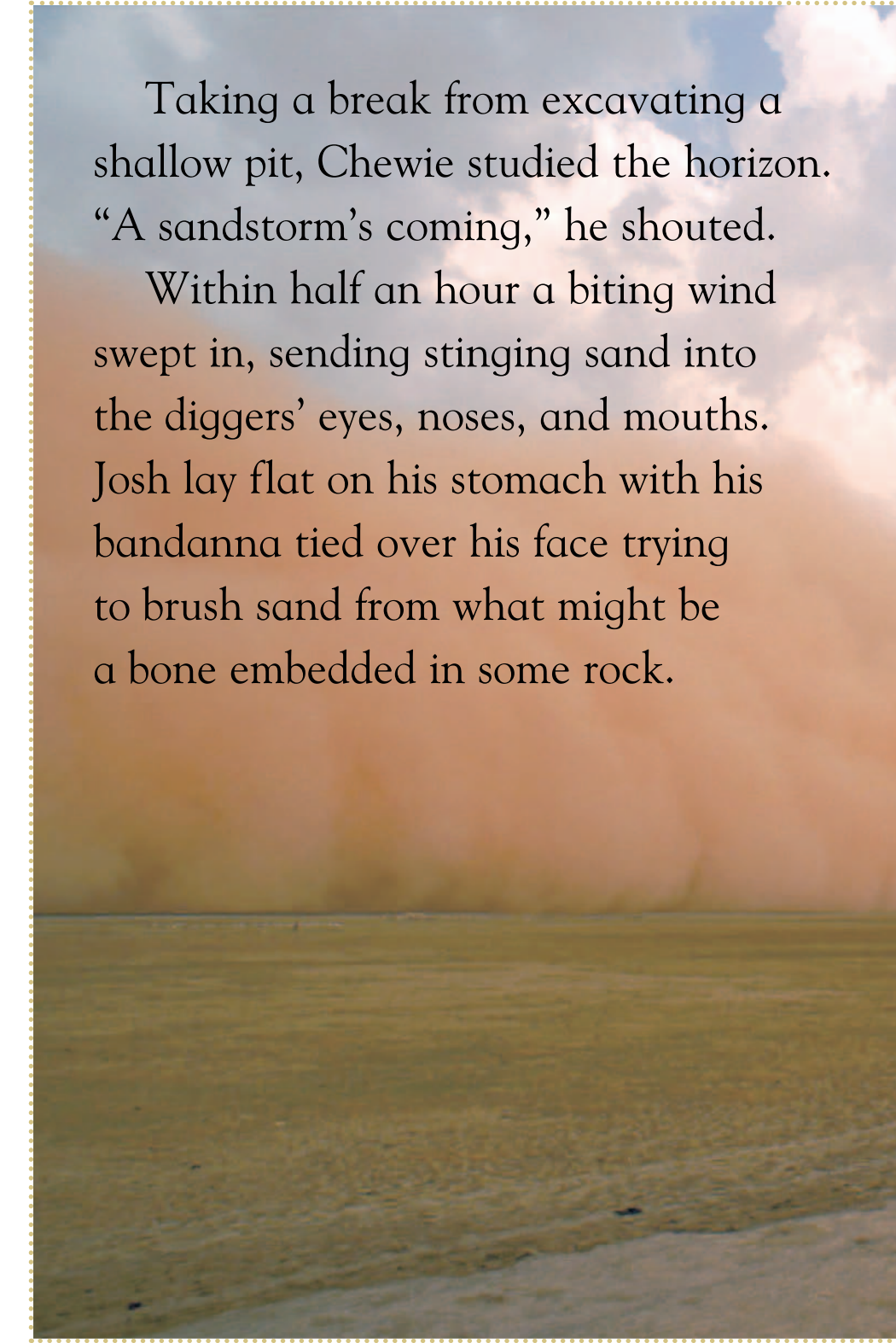
The team had only six weeks to find fossilized bones of dinosaurs. Most people think of deserts as hot places, but in winter it can get very cold. Digging hard kept the team warm during the day, but as soon as the sun went down, it was freezing.

After two weeks of digging, they had had little success. There were plenty of small pieces of fossils on the surface of the sand, but when they dug down, there was nothing underneath. Everyone was disappointed.



*Small pieces
of fossils*





Taking a break from excavating a shallow pit, Chewie studied the horizon. “A sandstorm’s coming,” he shouted.

Within half an hour a biting wind swept in, sending stinging sand into the diggers’ eyes, noses, and mouths. Josh lay flat on his stomach with his bandanna tied over his face trying to brush sand from what might be a bone embedded in some rock.

“This is pretty stupid,” he said. “I’m uncovering something and 30 seconds later it’s covered up again. But it’s only a small scrap of bone anyway.”

Josh was worried that the bones might have crumbled away to dust.

“Maybe this is all there is,” he wondered. “Perhaps Stromer discovered everything, and there is nothing left for us to find.”

Protective gear

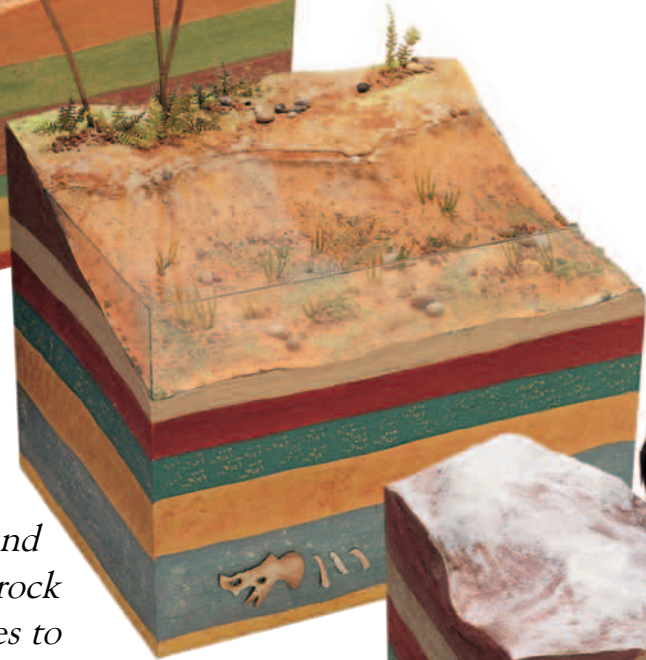
It’s important to wear proper clothing on a dig. Gloves protect hands from jagged rocks, and goggles keep eyes free of stinging sand.



Deeply buried dinosaur skeletons are brought closer to the earth's surface when earthquakes disturb the rock layers.



1. A whole dinosaur skeleton before it becomes buried deep in the earth.



2. Minerals and water in the rock turn the bones to stone over time.

3. Movements in the earth gradually push the skeleton toward the surface.



Fossil hunters find the remains in canyons and cliffs where many layers of rock are exposed, or on ground shifted by landslides. Then they use hammers, pickaxes, and drills to get to them. Often the weather does the hard work and the bones end up close to the surface. In the desert, wind and sandstorms wear away the layers of rock. But if no one finds the bones, they crumble away to dust.

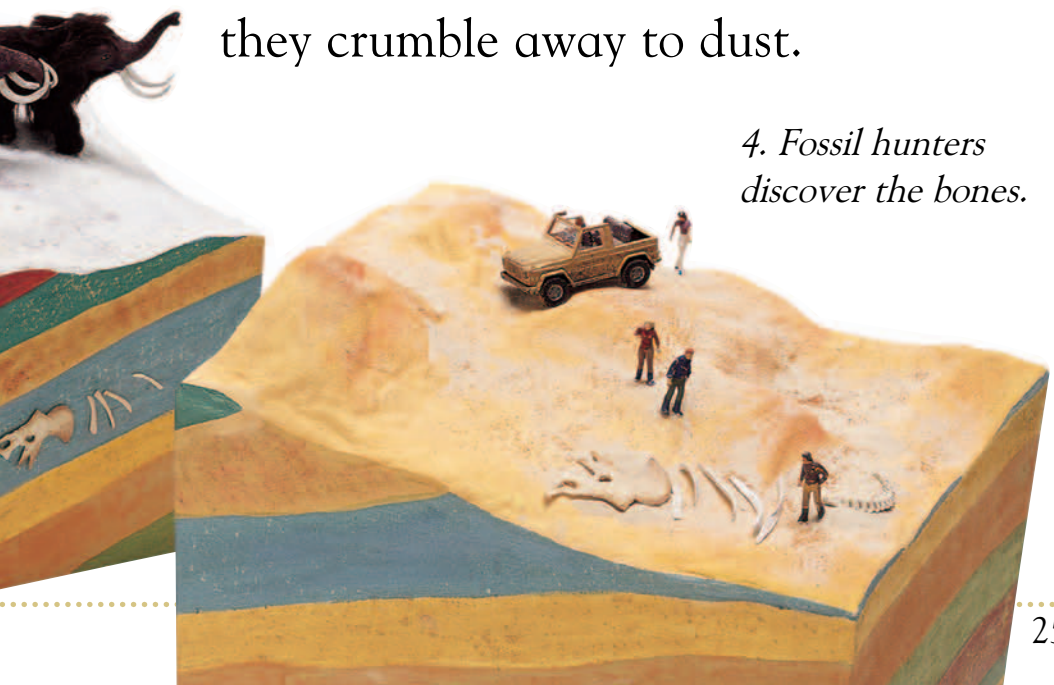


Pickaxe

Chisel

Hammer

4. Fossil hunters discover the bones.



The big bone

Josh began to think about the broken bone he had found with Jen on their first trip a year earlier. It was right on the surface and there was probably not much underneath it. But why not take the team back there to look?

Throwing their tools into the SUVs, the fossil hunters, together with the film crew, headed off to the new site.



*Team working
at the new site*



Dinosaur fossils uncovered

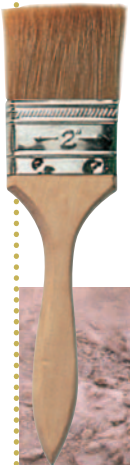
The bone was lying just as Josh had left it. Not far away the team could see more bones. Grabbing shovels and hammers, the workers began to pick away at the soft rock beneath the sand. Almost immediately they found what they had been searching for—glimpses of large bones embedded in the rock. They had struck dinosaur gold.

The bone quarry buzzed with excitement. Josh was chipping along the edge of a large bone using a dental pick and brushes. A few feet away Chewie was chiseling out something just as big. Then they realized they were working on two sides of the same bone.

“This is the top end of a humerus,”

Chewie cried, identifying the curved upper-arm bone.

Paint brush

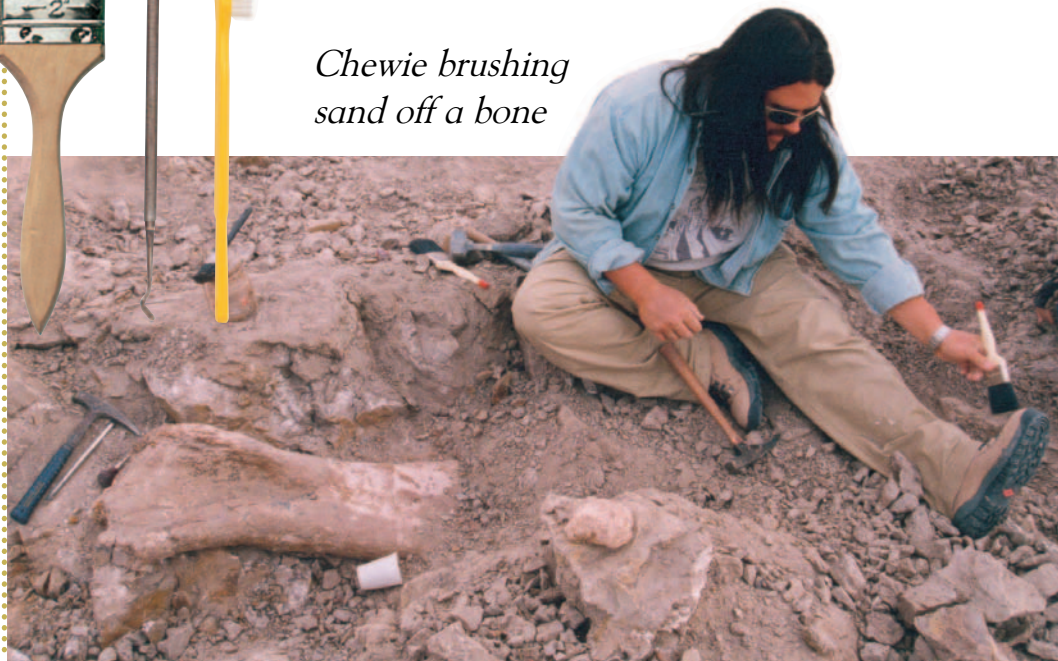


Dental pick

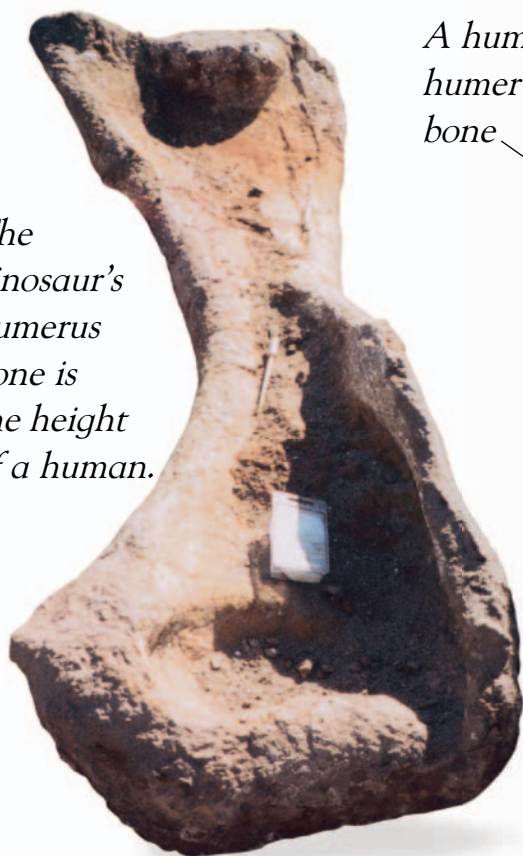


Toothbrush

Chewie brushing sand off a bone



The dinosaur's humerus bone is the height of a human.



A human's humerus bone

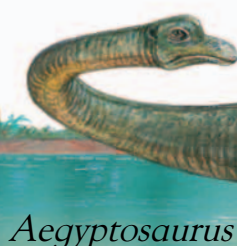


“Can’t be,” laughed Josh. “If this is the top, the other end will be way down there. Nothing’s got a humerus that big.”

But after a day of hard digging, Josh and Chewie presented the biggest humerus they had ever seen. It was 5 feet 7 inches (1.7 m) long—as tall as a man.

The humerus belonged to a sauropod—a long-necked plant-eating dinosaur—that roamed in the Cretaceous Period. The size of its bones told Josh that the sauropod he had found was very big.

It normally takes months to dig up the bones of such a large dinosaur, but the team had just three weeks left.



Aegyptosaurus



Spinosaurus

Dinosaur times

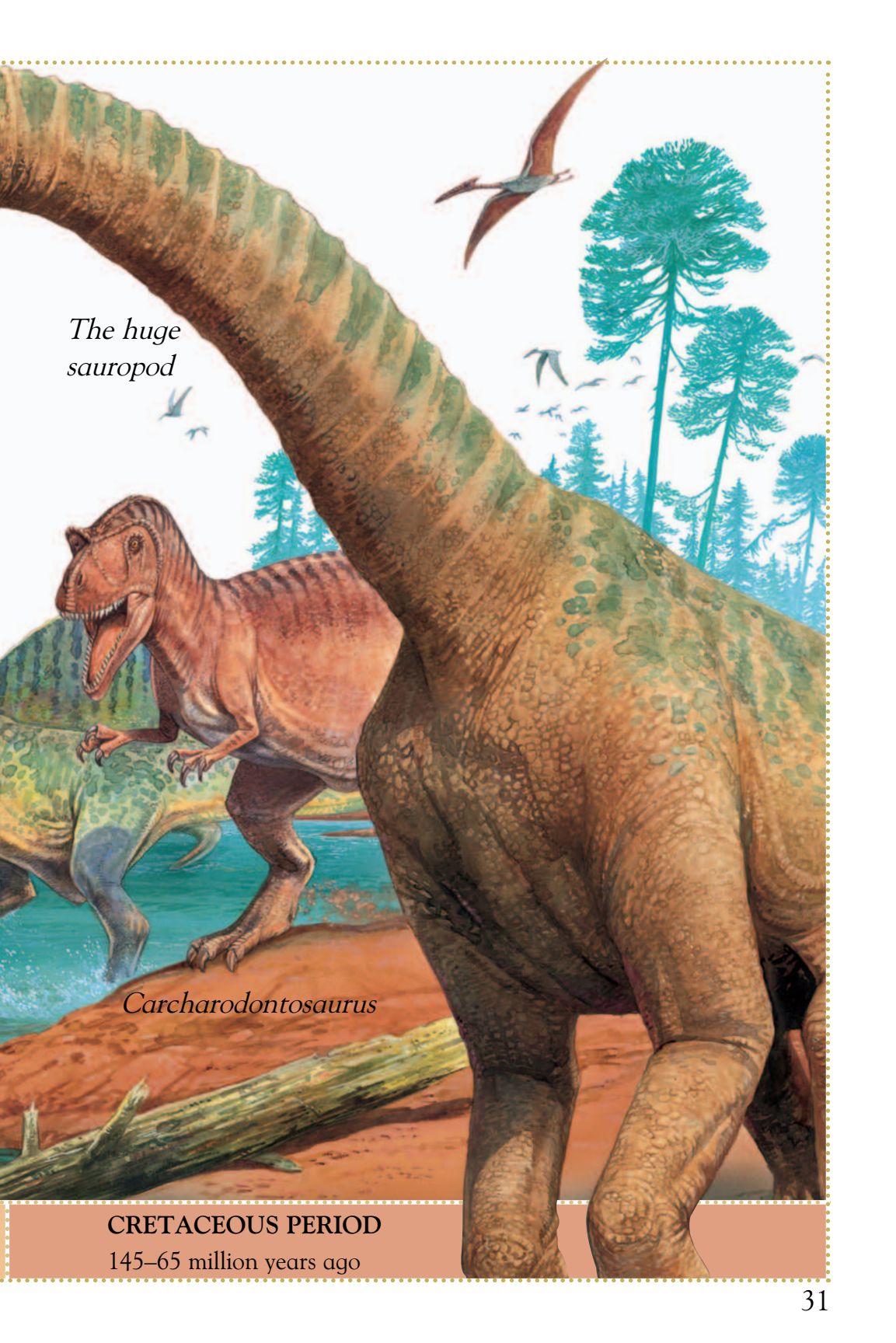
The earliest dinosaurs lived 230 million years ago. The last ones died out at the end of the Cretaceous Period, about 65 million years ago.

TRIASSIC PERIOD

230–208 million years ago

JURASSIC PERIOD

208–145 million years ago



The huge sauropod

Carcharodontosaurus

CRETACEOUS PERIOD

145–65 million years ago

The diggers hacked out a large block of sandstone containing a fossil by digging a trench around it, leaving a pedestal of earth underneath.



Then they painted the bone with a special glue to prevent it from crumbling, and covered it with aluminum foil for protection.



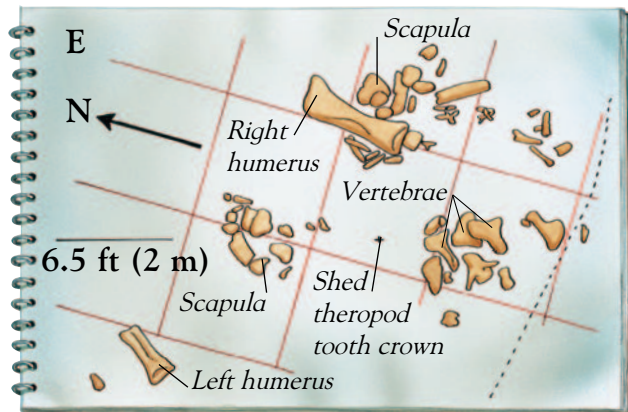


Putting on the plaster of Paris is just like wrapping a broken arm in a cast.

Next they put on a jacket of bandages and plaster of Paris to protect the bone while they freed it from its pedestal and dragged it slowly out of the pit.

Chewie drew diagrams to show exactly where the bones were lying to help them fit the bones together later.

The sketch shows the position where the bones were discovered.





Mud rocks showing ripples

The team also found patterns of ripples and waves on what was once deep mud, as well as fossils of ferns and roots. This meant their sauropod was not standing on dry sand—it was walking in a seaside swamp full of lush plant life.

Shifting Earth

The surface of Earth shifts constantly. During the age of the dinosaurs, continents collided and broke apart and oceans came and went.



Matt found another site littered with the fossils of fish, turtles, crocodiles, and other creatures that lived in this tidal mudflat.



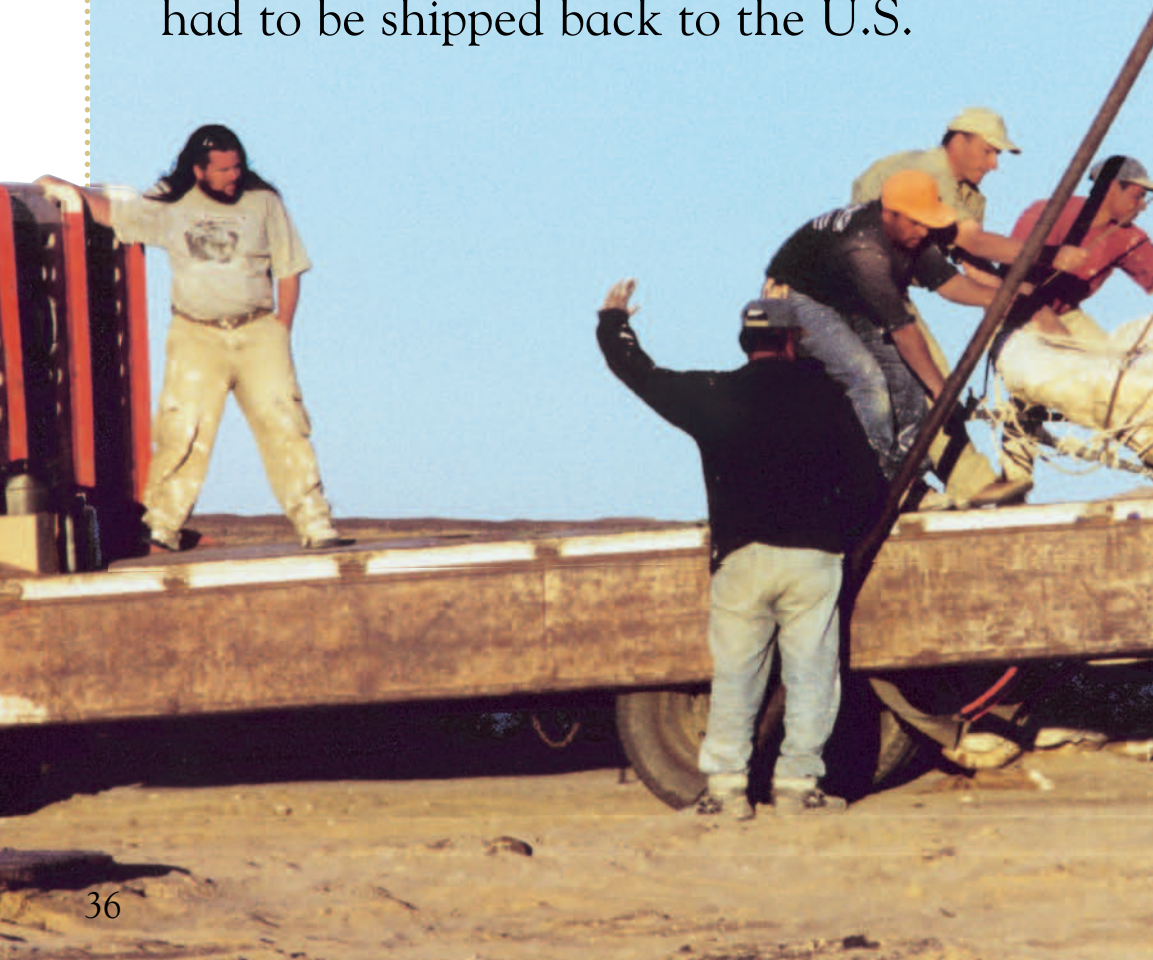
Leaf fossil

This was more evidence that the dusty desert may have been a very different place 100 million years ago.

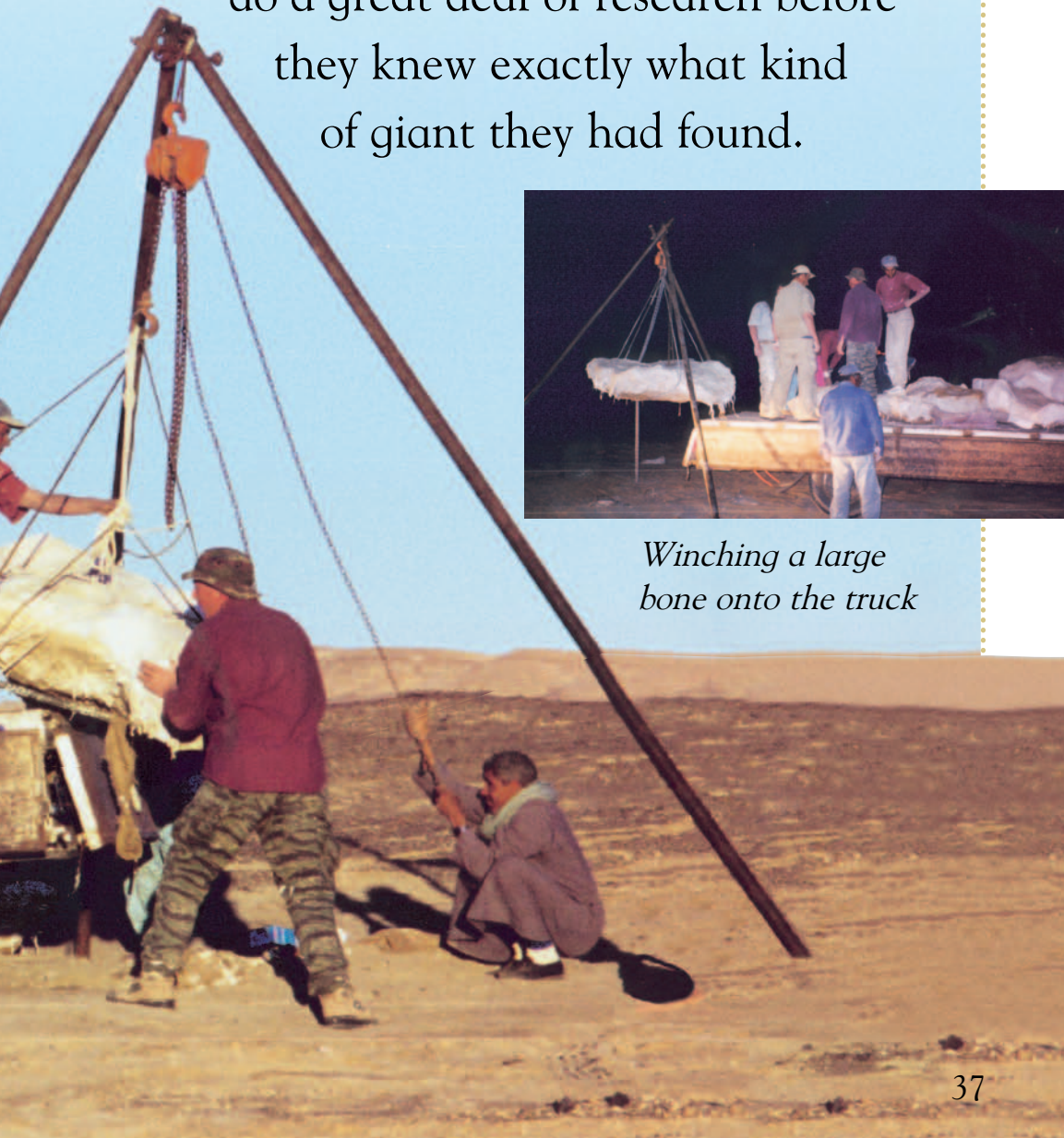


*Fossilized skull
bone of a giant
coelacanth fish*

As the days sped by, the pile of rocks and fossilized bones grew. The field workers had shifted five and a half tons. In their plaster jackets, some of the fossils weighed as much as a steel girder. The team winched the heavy ones onto a flatbed truck. On the last night they worked by moonlight. Then the bones had to be shipped back to the U.S.



Once there, the bones and fossils could be examined in the university's laboratories. Josh and his team had dug up a giant. But they would need to do a great deal of research before they knew exactly what kind of giant they had found.



Winching a large bone onto the truck

The tidal giant

In the laboratory, Chewie and his team of paleo-detectives had delicate work to do. They used a cast saw to cut the plaster jackets off the bones. Then the painstaking task of removing the fossils from the rock began.

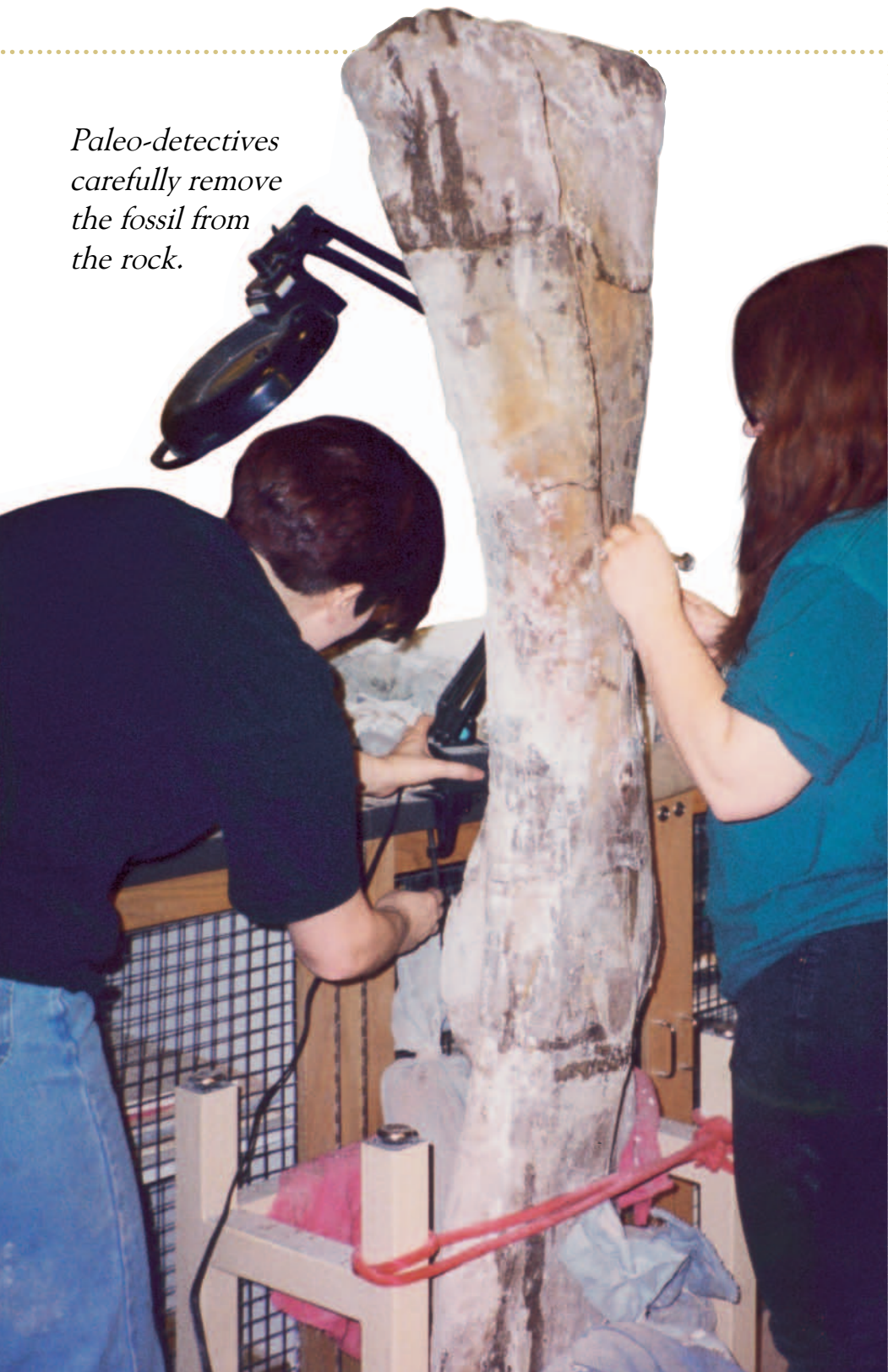
Chewie began with the humerus and some vertebrae (backbones) and worked with an airtscribe—a jack hammer about the size of a pen that taps off tiny pieces of rock. As he got closer to the surface of each fossil, he used dental picks and paint brushes to brush away dust.

As soon as the fossil was exposed, he painted it with a liquid plastic to prevent it from breaking.

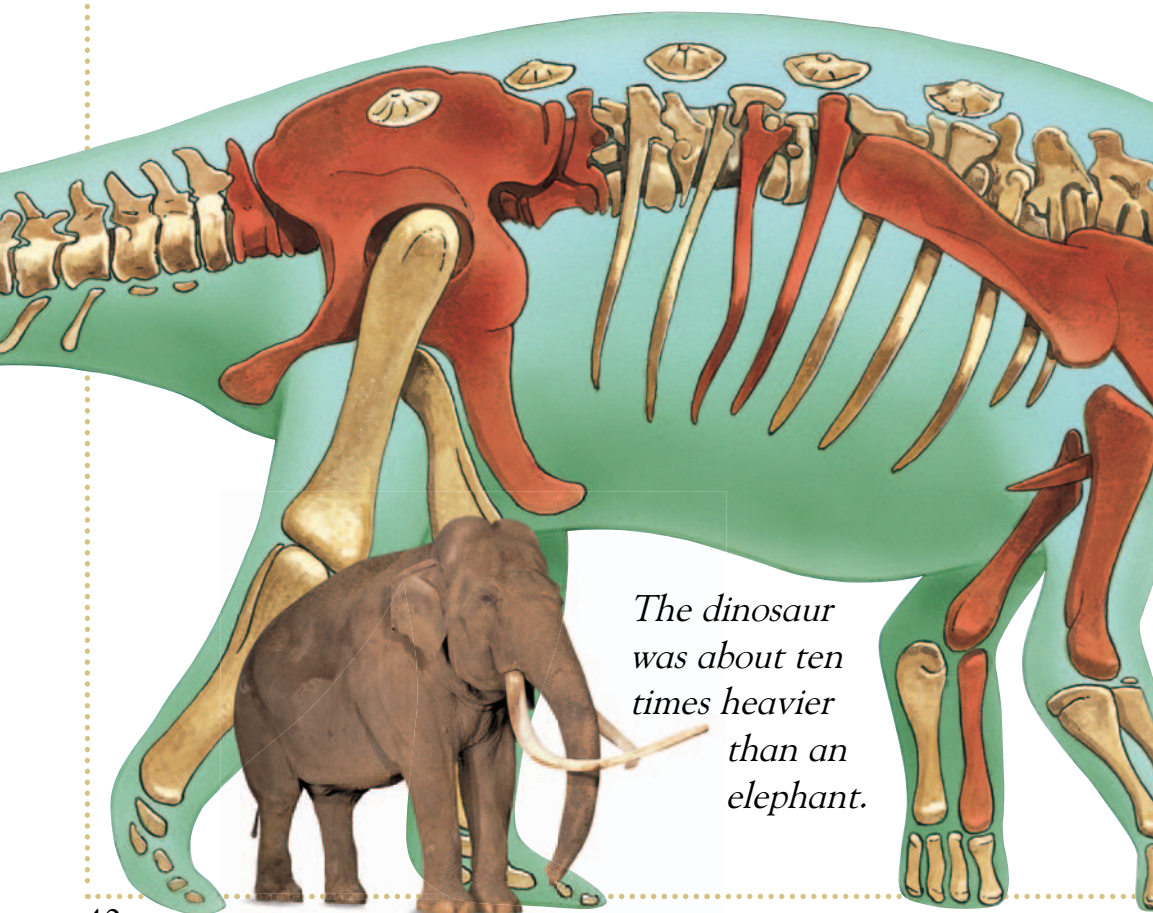
Using an airtscribe to remove rock



*Paleo-detectives
carefully remove
the fossil from
the rock.*



It took almost a year to process the fossils. In the end, there were enough bones to build about a quarter of a dinosaur but not enough for a complete skeleton. However, by comparing the bones with similar dinosaurs, the team could figure out what their creature would have been like.



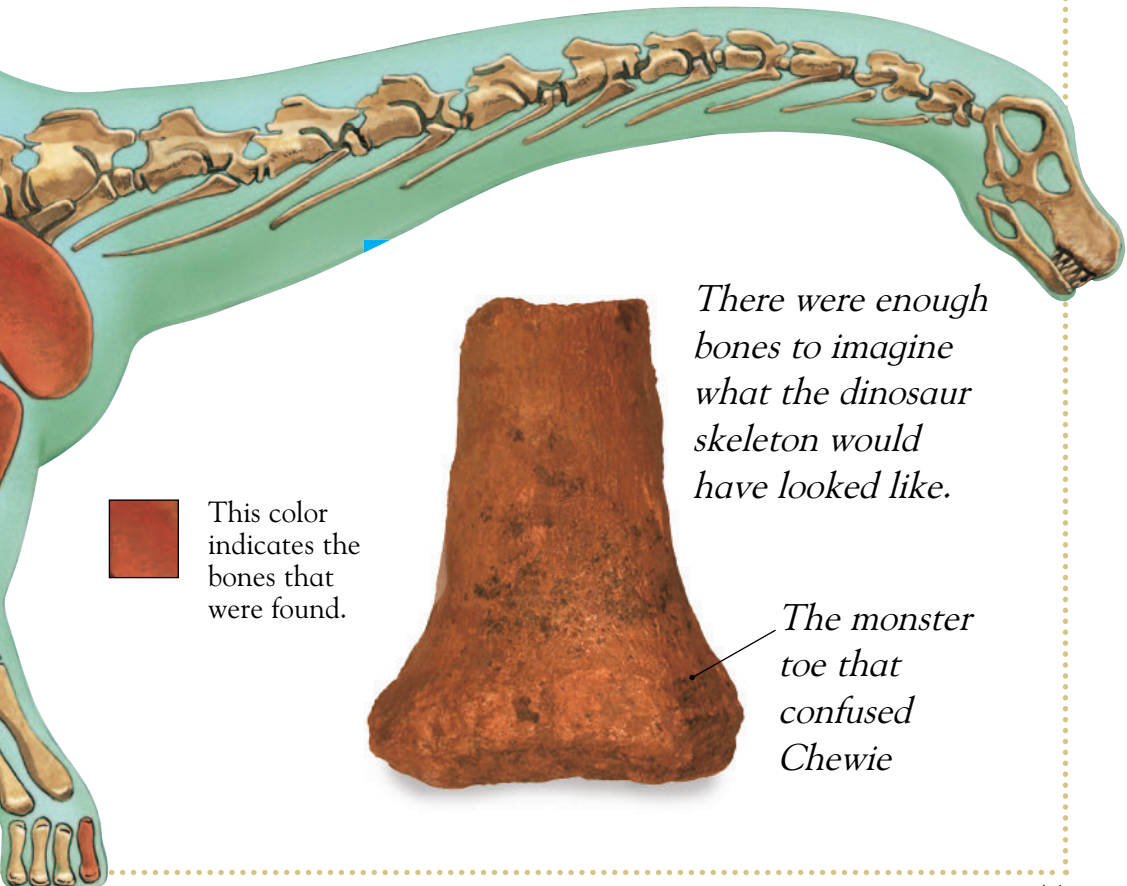
*The dinosaur
was about ten
times heavier
than an
elephant.*

Building work

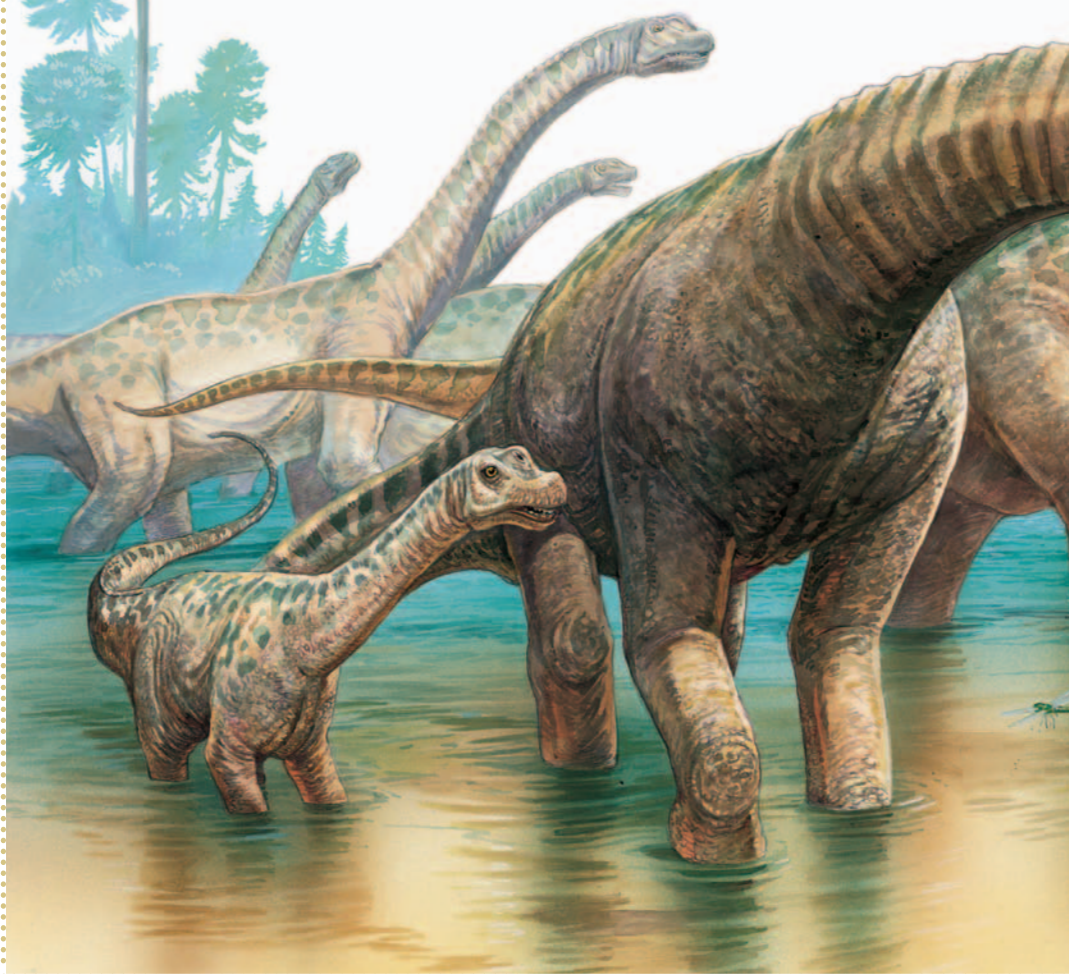
Lab workers cast molds from the bones of a dinosaur skeleton to make lightweight replicas for display in a museum.



Only one bone, as long as Chewie's forearm, didn't seem to fit anywhere—until Chewie realized it was a huge toe!



Although there were not enough bones to reconstruct their dinosaur, the team knew enough about sauropods to make some good guesses about its appearance. They could see where muscles were once attached to bones. This helped them flesh out their dinosaur.



They imagined the creature would have moved through the swamp with the lumbering gait of an elephant.

No one knows what color dinosaurs were, so Josh could choose whatever color he liked.

“Let’s make ours green,” he said.



*Traveling through
the swamp*



Josh and the team geologist, Ken Lacovara, wanted to find out more about the environment in which their seashore giant lived, so they traveled into the biggest swamp in the United States—the Everglades in Florida. The region is peppered with many



thousands of tiny islands. Tides from the Gulf of Mexico lap over the mud.



Alligators, manatees, fish, and turtles swam beneath the water, but Josh and Ken were more interested in tree roots and deposits of mud and sand. These matched what they had found in the desert. Now they felt sure that their dinosaur had lived in a tropical swamp.

Alligators swimming between tree roots





A year and a half after their dig in the desert, Josh announced the team's discovery to the press. Their sauropod was huge. It was about 80 feet (25 m) long and weighed up to 50 tons.

It would fill a tennis court easily. It was one of the biggest dinosaurs ever found. More importantly, its bones were slightly different from anything that had been found before. They had discovered a new species of dinosaur.

If you find a new dinosaur, you get to name it. The team chose *Paralititan stromeri*. *Paralititan* is Greek for “tidal giant,” which suits a creature that lived in a tidal swamp. *Stromeri* is a tribute to Stromer, the paleontologist who started Josh and his friends on the path to their adventures.

Heavyweight champion

The heaviest dinosaur is a plant eater from South America. *Argentinosaurus* is believed to weigh in at around 100 tons.



The vertebrae of Argentinosaurus

Glossary

Badlands

A bleak landscape where great expanses of rock are exposed to the weather.

Bandanna

A colorful cotton scarf.

Cast saw

A saw that is used to cut away a plaster cast from a fossil.

Cretaceous Period

Part of Earth's history that lasted from 145 million years ago until the dinosaurs died out 65 million years ago.

Dinosaurs

Land reptiles that lived between 230 to 65 million years ago. The name dinosaur is the Greek word for "terrible lizard."

Earthquakes

Tremors and shaking of the earth's surface, which usually occurs along faults (fractures or breaks) in the earth's layers.

Everglades

A huge area of swamp with thousands of tiny islands in Florida on the Gulf of Mexico in the United States.

Fossils

Traces of animals and plants that have been preserved in rocks.

Humerus

A bone of the upper arm in a human or the upper front leg in a four-legged animal.

Jurassic Period

The middle period of the age of the dinosaurs that lasted from 208 to 145 million years ago.

Manatee

A rare plant-eating mammal that lives in water, and is in danger of becoming extinct.

Paleontology

The science of life on Earth as it was millions of years ago.

Sahara Desert

The largest desert in the world covering a huge area of North Africa.

Sauropod

One of a group of plant-eating dinosaurs with long necks and legs like tree trunks.

Spinosaurus

A long, slender meat-eating dinosaur about 50-feet (15.2 meters) long with a huge fin on its back.

Triassic period

Part of Earth's history that lasted from 230 to 208 million years ago during which the dinosaurs first appeared.

Pronunciation Guide

Carcharodontosaurus
Kahr-KAR-o-DON-to-SAWR-us

Bahariya

Ba-har-EE-uh

Aegyptosaurus

Ee-JIP-tuh-SAWR-us

Paralititan

Pah-RAL-i-TI-tan

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It's a race against time as Josh Smith and his team dig up dinosaur bones in the desert.

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